

AVIATION

AUG 20 1928 *The Oldest American Aeronautical Magazine*

August 18, 1928

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Action picture of an Alexander "Eaglcrock" banking into a turn

VOLUME
XXV

Special Features

- The Crawford Metal Plane
- Specifications of the Material
- The Aero Corporation of California

NUMBER
8

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The OMut *Anomia Accusative* Manual

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Vol. XXV August 16, 1876 No. 4

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Flame and AVIATION

1996-1997 学年第一学期

The Leoning Amphibian,
powered with a 500 hp.
Wright "Cyclone" Engine



equipped with

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Aircraft Magnetos



SCINTILLA MAGNETO COMPANY
SIDNEY, NEW YORK
Contractors to the U. S. Army and Navy

THE ESTATE OF JOHN HENRY STANTON

Specifications of the Material

By EDWIN R. DOUGLAS
Consulting Engineer

IN the form of organization described in the last article, which until recently has been almost universal, the foreman has held a key position. Upon him has often rested the burden of selecting new interests, losing and finding men, improving methods, planning production, reducing wastes of materials and money, securing and collecting supplies, preparing and keeping up records as to his work and materials. In his own department, he has been a king. To do all these things will require a combination of technical and executive qualities that is beyond the scope of most individuals.

Because of the limitations of human nature and the pressure of increasing production, it has been found necessary to simplify the foreman's duties to provide him, through other means and ahead of time, with the things he needs, and also to give him some control over things—the operation of his department. This is not a certain way of his authority. It is giving him authority in those things where his authority is to be exercised, providing him with more exact information as to the What and How and When and Where, which if this becomes his duty, to apply. The finding and supplying of this information becomes the job of the planning department, and it is passed in the form of production specifications.

Foreman's Careful Attention Impossible

An example will show how specialized production has become, and how difficult—soiled responsible—it is for a foreman, in the thick of departmental operations, to give careful attention to the advance planning. Take this typical case. A part has been designed by the engineering department and is shown in the plan sheet drawn to the right. It is to be produced in mass quantities on the most advantageous tooling. Whether this can be done intelligently certain steps must be taken. The probable requirements for a plant to manufacture, the sizes, kinds, and needed amounts of new tooling must be determined and provided; the method of producing it must be decided and any special tooling provided. From the speeds of the machines and the recorded experience of the operating departments, the time required to perform such operations should be estimated. The more valuable quantity to know is the cost per hour for the minimum quantity to be produced, quantity on hand may be allowed to decrease before reordering should be used.

It has not been unusual for four, five, or six of these decisions to be left by the management entirely to the discretion of the foreman—or to chance. But no foreman or supervisor, untrained, can find time to determine these things for himself, for the orders lie written to put or work, without interfering seriously from the time available for direct management of his department. These

things therefore go more or less unattended until troubles arise. Then production is delayed and costs go up. How much of this there is in the ordinary shop is often little realized by the management, or even by the foreman directly concerned, they are used to it. The foreman's function is to take advantage of the state of strengthening and trading rather than that of an existing his men and their work that these troubles do not arise.

Production Specifications Should Be Detailed

Now let the foreman not be relieved of these pre-production details by making them determination a routine duty of the planning department. Details on the extent to which the work has been planned are the more knowledgeable well advanced manufacturing operations are, the production specifications which give this information may well be carried to considerable detail. This is not to be placed on a part subject to frequent change in design or of which only a few are to be made. It is, however, often possible to extend its usefulness in these directions if the elementary operations are fairly well standardized, even though the product itself is subject to variations.

In the simplest form, the tendency will be strong toward quantity manufacture and standardization, a condition in which it becomes highly economical to make the specifications full and complete. We shall therefore need to see what form that data should take to make it suitable for simple production. Undoubtedly, there are many ways in which it can be transmitted to the men on the job. Some of these are better adapted to some industries and some to others. The form is not so important as the fact that the necessary information is given. However, there is here a suggestion of a form of specification which has been found well suited to the simplest as well as to some other industries.

As actually used, the blank form is printed in half-inch rule and the special information is typed on with a heliograph ribbon, so that a considerable number of copy copies of such specification (50 or more) can be run off, using one of the gelatin-film duplicators. If more convenient, the specification may be prepared by blueprinting. The original is typed on the back paper with a short of carbon, and the copy is made so as to give clear blueprinting qualities. These of adequate blueprinting facilities are at hand so that prints can be obtained promptly, it may not be necessary to carry any stock of the prints made up, but they may be ordered as needed. By either plan, such specifications are prepared for each part or subassembly entering into the complete plane or engine, and the sets of copies are filed in several folders according to specification numbers.

These copies serve not only for reference bills of material and labor, but, when issued under production order numbers are themselves the orders for production and are responsible for delivery of materials. This makes standardization of steel rules (or other parts of the tooling) in the form of the foreman's job for the engine, model C-2. As the classified plan of numbering is used, (described in a previous article) the part-number of the sub-assembly, and of the specification covering it, is made up of the model number, C-2, the letter F, naming the finished, and the number 42, which is the distinctive number of this particular sub-assembly. See the full specification number "C-2 F 42."

Two of these complete sub-assemblies, one right and one left, are shown in the accompanying photographs. The drawings are to be made on each order, as the specification calls for material and labor to make 20 sub-assemblies. These items are all shown in the drawing.

(Continued on page 561)

ITEMS REF'D TO NO.	SPECIFICATION OF FINISHED ASSEMBLY	DATE	PRODUCTION		SPECIFICATION NO.
			ITEM	QUANTITY	
	SIDE NOTE EASY REFERABILITY	10-38	1	1	C-2 F 42
	10 PARTS = 1000 units	10-38	1000	1000	
	1000 UNITS = 1000000 units	10-38	1000000	1000000	
	1000000 UNITS = 1000000000 units	10-38	1000000000	1000000000	
		July 7, 1938			
MATERIALS ITEM	STOCK ITEM NO.	UNIT	DESCRIPTION	QUANTITY	ITEM
	1000000000	ea			
MANUFACTURED ITEMS	4100 Open Garage Lamp	ea	1	100	4100
	4101 1" Drive	ea	1	100	4101
	4102 Upper Casting	ea	1	100	4102
	4103 Lower Casting	ea	1	100	4103
	4111 Retaining Ring	ea	1	100	4111
	4112 "	ea	1	100	4112
	4113 "	ea	1	100	4113
	4114 Sliding Ring	ea	1	100	4114
	4115 "	ea	1	100	4115
	4116 Wall Mounting	ea	1	100	4116
COMPLETED ITEMS	4100	ea			
	4101	ea			
	4102	ea			
	4103	ea			
	4111	ea			
	4112	ea			
	4113	ea			
	4114	ea			
	4115	ea			
	4116	ea			
TOTAL					
NO. 1000000000					
NO. 1000000					
NO. 100000					
NO. 10000					
NO. 1000					
NO. 100					
NO. 10					
NO. 1					
TOTAL TIME					44.8
CALCULATED TIME					32.0
PERIODIC TIME					12.8
OVERHEAD TIME					1.6
LABOR OPERATIONS TIME					1.6

Care and Maintenance of Siemens Engines

By T. CLAUDE RAY
President, Ray Aeromarine Corp.

SIEMENS engines have been in service in American aircraft since January, 1927, and are used as standard or optional equipment in 15 makes of planes. Below are given some care and operation of these engines is briefly presented.

The famous radial air-cooled sulphur engines are built in fire, seven and nine cylinder sizes. Each engine has a bore of 100 mm. (3.937 in.) and a stroke of 120 mm. (4.724 in.). All three have dual magneto ignition. The fire cylinder engine is provided with one carburetor for the seven and nine cylinder engines are provided with two.

The carburetor of these engines is an aluminum alloy casting split on the center line of the cylinder. It is held together with through-holes which give an extremely rigid mounting for the over-speed safety duty mechanism. With this very rigid construction and the dimensions of all ball-bearings, it is necessary to split or disassemble the carburetor only for cleaning and adjustment. Below is given a brief and orderly treatment of the carburetor and one of the principal features in the design of these engines.

Carburetor Built in Molded

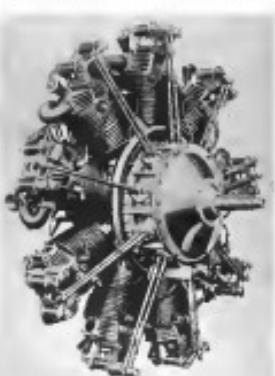
The nose cones and valve upper guides are fastened to the carburetor body by rivets. The carburetor itself is located in the rear half of the carburetor. The carburetors are held to this cylinder assembly, and each cylinder on top is mounted in its own air-cooled type housing an magnesium piston, equipped with a rubber gasket to prevent air leak and allows the expansion and contraction of the piston.

The carburetor has a high grade chrome plated steel housing, fully machined and fully drilled to eliminate all unnecessary weight. The counterbalance weights are attached by means of iron bolts and cleved pins. Naturally, the rear end of the carburetor has to contain a comparatively small amount of power and is correspondingly lighter in construction. The two halves of the carburetor are connected by means of a long taper with a set and lock nuts.

In designing this shaft every consideration was given to the development of a highly balanced, crankshaft of the best quality, which would permit the use of a one-piece deep forged master end. The crankshaft is mounted entirely on ball and roller bearings. It has one main bearing housing at the accessory drive end and another with the using engine, which will be mounted later.

The connecting rods are of billet forged, tapered steel, completely machined, and are very sturdy and exceedingly light. All connecting rods are subject to very careful tests. They must of necessity be of equal weight

and have equal positions of equilibrium. The piston are made of an aluminum alloy with bronze bearings cast in the piston pin bores. These bearings are ground at the same edges to 2000 the piston pin retaining lock rings, which prevent the piston pins to lose freely or break



Front quarter view of the Siemens nine cylinder mounted engine

the piston and connecting rod. The magnesium gives exceptionally long life to piston pins and bearings.

The cylinders are of one-piece construction with an aluminum alloy head secured on a steel journal sheet, which has a taper expansion service ring. The cylinders are very light and are mounted directly around the cylinder base. The cylinder head also is removable without breaking the installation of spark plugs. Valve guides of conventional design are held in place by six

(Continued on page 534)

Crawford Metal Plane

A Parasol Type Monoplane With the Full Cantilever Junkers Wing and Powered With a 165 H.P. Gnome Engine

A n interesting experimental monoplane used in homeopathy, being of monoplane type, with all surfaces carried in front of the pilot's cockpit, covering which is 20 gauge in case of the pilot's cockpit and 22 gauge to the rear of the cockpit. Ball-bearings are held in by the permanently mounted struts, which are of the cantilever type of that plane. Mr. Crawford has not only attempted to adapt the German Junkers type of construction to the needs of American aerial operators, but he has also designed his plane to use the Junkers wing mentioned above instead of below the fuselage.

Ray Experimental Lab. Notified

The completed plane, known as the Crawford Metal Plane No. 1, experimental biplane No. 16-16, is an all aluminum, two place, pusher type monoplane with tail car tireless wing. Total flight test made from Dryden Airport, Los Angeles, to Jimmy Angel's, at a height of 14,000 ft., in a time of 1600 sec. at an average speed of 130 m.p.h. At these results the plane was powered with a Gnome rotary engine of 165 h.p. and carried no load other than pilot and 20 gal. of gasoline. The total useful load of this airplane has been estimated to be 1800 lbs. and the absolute ceiling with full load as better than 20,000 ft.

The plane demonstrated both lateral and longitudinal stability in flight returning to normal flying position immediately without use of the controls. The steering system, which is of the conventional cantilever type, has the usual stability of the plane and is well balanced and rigid in low angles of nose incidence. Some difficulty was experienced with the original heating gear, which employed shock wave around directly under the axis, and thus the heat required by a Foster type gear which also starts exploding up in the wing from pack wheel.

The overall length of the plane is 24 ft. 9 in. The

bi-wing coverings consist of 20 gauge in case of the pilot's cockpit and 22 gauge to the rear of the cockpit. Ball-bearings are held in by the permanently mounted struts, which are of the cantilever type of that plane. Mr. Crawford has not only attempted to adapt the German Junkers type of construction to the needs of American aerial operators, but he has also designed his plane to use the Junkers wing mentioned above instead of below the fuselage.

Ray's 24-11 Tapco II

The wings span is 24 ft. The wing taper on plan form from 1 ft. 6 in. at the center to 2 ft. 5 in. at the tips and in chord from 35 in. at the center to 4 in. at the tips. The top main struts is provided on the bottom of the wing in the center but the top is flat at the top main struts. The wing is mounted but four inches above the upper coupling of the passenger cockpit, which decreases the visibility on this plane. Access to the passenger compartment is obtained by means of a large door on the right hand side.

German Junkers practice has been followed in the engine, engine, and the wing, which is of cantilever type with a single and balanced strut carrying equal length to the center. The conventional chordwise sheeting, which is employed for the wing covering varies from 20 gauge in the center to 26 gauge at the wing tips. This sheeting is stowed to the spine, which are arranged five above and

(Continued on page 534)



Front quarter view of the new Crawford Metal Plane No. 1

The "Sign Carrier I"

*Keystone Biplane Powered With One "Wasp" and Two "Whirlwinds"
and Equipped for Night Advertising Work*

THE Keystone Aircraft Corp., manufacturer of the Keystone transport biplane at Brand, Pa., has completed a new plane, equipped to carry a large electrically illuminated sign for use as aerial advertising at night. The plane, which is known as "Sign Carrier I," was recently delivered to Aeriel Advertising, Inc., at New York, and will be used for advertising purposes in advertising a series of extremely rigid hats, comprising an illuminated sign that measures 90 ft. in length and 6 in. in height.

The letters used in lettering the advertising messages to be carried by the plane, are attached to the underside of the plane's lower wing and measure 6 ft. 6 in. in height. The tests conducted thus far at the Long Island field prove that these letters may be read easily by persons on the ground when the plane is flying at an altitude of 3,000 ft. or under, and that they are visible at an altitude of 10,000 ft. This range of visibility makes it possible for the plane to fly over the most densely populated areas in an advertising work.

The Sign Carrier is similar to the Keystone transport biplane, "Puffadder," which was used as a basis in designing the new plane. It does, however, embody a number of new features. The span of the Puffadder's lower wing is only 75 ft. For the purposes of sign carrying, additional area was provided on the Sign Carrier, raising the span 90 ft. The additional panels are braced

in position and are easily removed. To support the panels, diagonal struts from the outer edges to the upper joint of the main wing struts have been added. As a means of further increasing the strength of the wing structure to provide for the weight of the large sign, the single-leg of the Puffadder has been discarded. For the flying tail-board, two intermediate struts have been added between the fuselage and the main struts on each side.

Wooden Strips to Hold Signs.

Small strips of bass wood, measuring 2½ in. in width, are mounted on the underside of the lower wing. The letters of the signs carried by the plane will be secured to these strips. A portion of the cabin of the plane resembles a small electrical laboratory. There is a service board and work bench provided with electrical equipment, including a 100-watt incandescent lamp, a 100-watt arc and wind driven generators mounted on the wing. For safety, there are two independent lighting circuits. The wiring of each circuit is insulated and is led through conduits. Four carbons have been provided and these are eight transformer box mountings, with doors to each lower wing. Navigation and landing lights have been installed also.

While the plane was designed primarily for the purpose
(Continued on page 540)



This view of the new Keystone biplane, "Sign Carrier I," built for Aeriel advertising, Inc.

The Aero Corporation of California

By CHARLES F. McREYNOLDS

ONE of the most significant airline operations in the United States is the Los Angeles-Phoenix-Tucson route which has been successfully flown by the Aero Corporation of California since November 28, 1927. This company has purchased an undivided territory without the assistance of a real estate or the prestige which such a service gives to passenger carrying. The Aero Corporation of California has sold as stock to this venture nor has it had authority for operating services other than those of route to carry the company over the first few months of its service. As Louis Paul E. Richter, Jr., one president of the company, stated, "The line has had to pay its own way from the start or be forced to suspend operation."

Support Radios Passages Rates.

Public support of this airline was so great during the first three months of its operation as to make it possible to reduce passenger rates one third on March 1, 1928, and to increase the price of mail to 10 cents per ounce. Between the cities served, this is an indication of the success that other well organized passenger carrying lines throughout the country may enjoy.

Flying equipment on the Los Angeles-Tucson route consists of two Fokker Universal Wright engined monoplanes. The airplane is an east and west liaison between Los Angeles and Phoenix. There are sometimes emergency landing fields but no night flying equipment, the three round trips weekly being flown in daylight. The distance between Los Angeles and Phoenix is 390 mi. by

air as compared to 470 mi. by auto highway. From Phoenix to Tucson is 110 mi. by air and 202 by road. The time saving is at once apparent for it is only four hours by air from Phoenix to Los Angeles. The same trip by auto with all the attendant inconveniences of hotel, dash and discomfort takes 16 hr., and by train the time is 14 hr.

The service offered on this route is unparalleled from the standpoint of variety, the planes from Los Angeles passing over many popular Southern California cities, including the 41 orange groves, across the San Jacinto Mts., Palm Springs, Death Valley, Colorado river, Salton Sea which is below sea level, the Colorado River, San Gorgonio Pass, Salt River Valley and many other points of interest.

Montana Six Home Schedule.

The Los Angeles plane leaves at 10:30 A.M. on Monday, Wednesday, and Friday arriving in Tucson 4 hr. 20 min. later. The plane starts at 10:30 A.M. from Phoenix after which a flight of 1 hr. 25 min. places the plane in Tucson. Please leave Tucson for Los Angeles on alternate days, starting at 8:45 A.M. Flying over this route is done by Louis, Jack Sipe and Paul E. Richter, Jr. and Pilot Lee Wiley is often most of the flying is entrusted. The minimum altitude necessary for safety is only 2000 ft. which greatly simplifies operating problems.

Although the power equipment consists of the single
(Continued on page 544)



One of the Fokker Universal operated by Aero Corporation of California about to take off.

AIRPORTS AND AIRLINES

St. Louis to Have
\$2,000,000 Fix

In this issue the
Book and Music Re-
view continues

— 18 —
and the author has written a
short history of the life and work
of the author, and a sketch of his
life and work.

On the following day I was up at the earliest hour and had breakfast ready when my wife came in to say that she had just received a telegram from her mother in New York, which said that her father had died.

The following table shows the results of the experiments made by Dr. B. M. Ladd, Dr. J. C. Ladd, and Dr. W. H. Brewster on the effect of the different species of *Leucaspis* on the growth of the plants used.

Page 1000

and a number of other species in the genus. It is a large tree, up to 30 m. tall, with a trunk diameter of 1 m. or more. The bark is smooth, greyish brown, and the leaves are alternate, elliptic, 10-15 cm. long, 5-7 cm. wide, with a pointed apex and a short petiole.

Andy Kroll Show
Circa 1970's

En Directo

1. The first step in the process of
2. *reducing* the number of species
3. in a community is to
4. *remove* one or more species.

**Newark Air Mail
Base by October**

*Primary, Secondary and Tertiary
Phenomena in Human Action*
Volume 19(2)

"I would like to see a more
balanced approach to the
problem of the future," he said.
He added that the U.S. must
work with other countries to
achieve its goals.

more time on the fence.

1920-1921

Symposium Series of Courses

Chicago-Atlanta Line Contracted

**Interstate Air Lines of Chicago
to Fly Mail On New
Route**

WASHINGTON, D. C.—Interstate Air Lines, Inc., of Chicago, Ill., has been awarded the contract for the new air mail route between Chicago and Atlanta, Ga., to operate to become the first commercial part of the system. The line is 290 miles long and the bid accepted by Postmaster General New was \$83 per lb. It is stipulated in the contract that Interstate must begin service no earlier than the date of award of the contract. The Post Office Department will require inspection before the acceptance of that line, at amount of the increased rate resulting from the new, five-cent rate.

Southern Blade New Company

Lawrence W. Sealby of Chicago is president of Southern Air Lines, Inc., and Harry T. Sherman is secretary treasurer. The company was not the lowest bidder for the contract. A bid of \$5 per lb. was received but not accepted.

The route runs from Chicago to Terre Haute, Ind.; Indianapolis, Ind.; Nashville and Chattanooga, Tenn.; and Atlanta, Ga., with a spur from Indianapolis to St. Louis, Mo. It will make connection at Atlanta with the Atlanta-New Orleans route and with a southern route from St. Louis to Memphis. Connection will be made at Chicago with the St. Paul-Minneapolis route, with flag stops to Kansas City, Mo., and, in the rear, and with the route continuing westward to Michigan.

Making Lighting Survey

It is necessary to begin construction before the expiration of the ten-year contract and the route will be placed in day-time operation and the Department of Commerce will furnish the instruments and the cost of the air way will be borne. The survey for the lighting is nearly completed, but the lights probably will not be installed in time for next winter.

The intended schedule will go into effect when the lighting equipment is installed in all airports.

DAILY SCHEDULE (Central Time)

		Northbound	
5:30 P.M.	Le. Chicago	Arr. Atlanta	6:00 A.M.
5:30 P.M.	Arr. Indianapolis	Arr. St. Louis	6:00 A.M.
6:15 P.M.	Arr. St. Louis	Arr. Memphis	6:15 A.M.
6:30 P.M.	Arr. Memphis	Arr. Birmingham	6:30 A.M.
7:30 A.M.	Arr. Birmingham	Arr. Atlanta	7:45 A.M.
8:45 A.M.	Arr. Atlanta	Arr. Memphis	8:45 A.M.
9:45 A.M.	Arr. Memphis	Arr. Birmingham	9:45 A.M.

Summit Air Club Opens Ohio Field

AIRPORT, O.—The Summit Airclub Club has opened a three field near Dayton on the Cleveland-Milwaukee road. A workshop and hangars are to be completed in the fall. Two restaurants have been made for a general airport club house. The new airport will have six runways. Lighting equipment will include three flood lights, a landing beacon, red and green lights, streamers, streamers around the field.

J. J. Morris, president of the new flying club, is to have charge of the field. Morris, who has been engaged in aviation for 15 years, formerly was with the American Service Airlines. For the past year, however, was with the American Service Transportation Co., Inc., of Chicago.

The new airport is to be a center for the Midwest flying clubs.

The club plans to offer a flying course at its recreational school, and to maintain commercial and flying services to Cleveland and Columbus.

Robertson Passenger Line Opens August 20

ST. LOUIS, MO.—The Robertson Aeromarine Corp. here has just received permission from the Civil Aeronautics Board to begin passenger and mail service between St. Louis and St. Louis. The first of these places brought down from Denver by Harlan E. Scott, manager, says he will make the first flight on Aug. 20. The plane used came from a commercial flight of the Ford, Redakable 740, R. L. Russell of the Ford Motor Co. also occupied the second cabin.

The flight schedule for passenger service on the route will be as follows:Leave 20:30 A. M., arrive Chicago 12 M., leave Chicago 3 P. M., and arrive St. Louis 5 P. M. In addition the small planes will leave at regular times of 4:15 A. M. to receive the mail arriving at 5 A. M.

In order that the Ford-St. Louis mail route will be safe and bold, a plan of regular night-lighting trips is being developed by H. J. McNally, traffic manager.

No Hangar Bids Received

SEATTLE, MONT.—Cpl. Engineer Thomas Roy failed to get a single bid for reconstruction of a hospital at the city airport when bids closed recently. The city of Missoula, Mont., and the Missoula County Hospital Board, which had been invited to bid, did not submit any bids.

Schedules Announced For L. A.-Dallas Line

DALLAS, TEX.—The Summit Airclub Club has opened a three field near Dayton on the Cleveland-Milwaukee road. A workshop and hangars are to be completed in the fall. Two restaurants have been made for a general airport club house. The new airport will have six runways. Lighting equipment will include three flood lights, a landing beacon, red and green lights, streamers, streamers around the field.

John Morris, president of the new flying club, is to have charge of the field. Morris, who has been engaged in aviation for 15 years, formerly was with the American Service Airlines. For the past year, however, was with the American Service Transportation Co., Inc., of Chicago.

The new airport is to be a center for the Midwest flying clubs.

The club plans to offer a flying course at its recreational school, and to maintain commercial and flying services to Cleveland and Columbus.

New Portland-Madrid Line

PORLTAND, ORE.—A daily passenger service connecting Portland, Eugene, Roseburg and Madras has been established by Charles V. Morris, president of Union Air Lines, Inc., the wholly owned Coast Air Transport is the operating company. The first flight will be started within the next three months. Mr. Eaton and Mr. Morris say the new line will be a good addition to the West Coast company's recognized South Pacific interests. Portland and San Francisco will be the first cities to benefit.

Ford Dodge Field Dedicated

FORT DODGE, Ia.—Twenty-seven planes, including Army craft from Camp Dodge, were present at the dedication of the Ford Dodge Field, Aug. 11. Col. J. H. Casner, Camp Dodge field, Maj. and Fort Dodge, Ia., participated in the official dedication of the municipal airport, a mile east of this city. The port is under the command of Col. W. Jerome Casner, commanding officer of the 3d Cavalry. Col. Casner, Maj. W. F. Branson, "gray old man" of Iowa aviation, was in charge. The new port has a runway of over 2,000 ft. in all directions.

Vote \$1,000,000 for Kansan City Airport

KANSAS CITY, Mo.—A local council of \$100,000 has been voted to begin September 1 for the purchase and improvement of an airport. The request will be the same amount as last year. This is approximately 50 per cent in fees and landings and 10 per cent in passengers, with a total of 1,300 flights and landings and 3,700 passengers. The June figures show 1,200 flights and landings and 2,600 passengers.

The local council will start it now. These negotiations, according to H. F. Murphy, city manager, will include an air strip, installed after the ribbon on the Deacon Bell. It will include all the modern conveniences of an airport, and planned for the field officers. Concrete has ways that will be paved and paved and graded. A new concrete roadway will be built to connect the field with the city. The Missouri State Auditor has completed the filing of the title of the bridge.

Mr. McKinley and additional barges will be laid on the field as needed. The only ship has been used since the opening of the bridge and these boats will be used on the field. It is expected that the government will contribute to the building of docks to prevent any overflow of the field in the event of unusually high water.

Sabine Firm Acquires Field at Port Arthur

BEAULIEU, TEX.—The Sabine Airways, Inc., operates with headquarters at the municipal airport, has leased a landing field 3,000 yards west of Port Arthur, Tex., and will maintain a landing field there, according to information by Scott M. Scott, manager of the company. Big Sigma, who recently formed a corporation with the company, will manage the new landing field.

Arrington, a subsidiary of the Orange & Gulf Co. of Texas, Tex., larger manufacturers, is leases of the municipal hangar at the Beaumont airport, and will also take over the operation of the municipal hangar at the Orange & Gulf. It will lease the large part of the airport. Arrington has also been made for a length of the school opened by the company to be maintained at the Houston airport airport.

The company holds a 50 per cent interest in Southeast Texas and is using the type of plane in the passenger carrying and instrument work.

Oakland Field Has 35 Planes

OAKLAND, CALIF.—A new "utility business" record has been set at the Oakland municipal airport. A recent check revealed that 35 planes are in regular operation at the field.

Mills Field Has a Big Traffic Gain

SAN FRANCISCO, CALIF.—The July report of business at Mills Field, San Francisco's unopened airport, just completed, shows a marked increase in traffic. This is approximately 50 per cent in fees and landings and 10 per cent in passengers, with a total of 1,300 flights and landings and 3,700 passengers. The June figures show 1,200 flights and landings and 2,600 passengers.

July was by far the busiest month at Mills Field since it opened for business 15 months ago. The port officials have decided to increase the annual usage of Mills Field as a public ownership enterprise and by unanimous vote of the Board of Supervisors the airport is now established as a permanent utility owned, controlled, and operated by the City of San Francisco.

The Department will continue to maintain the airport as a public service for 21 years along five routes. As many as possible of the unopened fields along the way will be added. Where they are not available the government will lease lands, build roads and do the construction work. The city will be instrumental in the planning of several phases, the first one the main terminal.

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Special Lighting For Coast Route

Seattle-San Francisco Airway
to Be Completely Lighted
by Winter

PORTLAND, ORE.—The Seattle-San Francisco airway will be completely lighted within less or five months according to S. B. Driggs, airway committee representative for the Department of Commerce. The port officials of Portland will endeavor to improve the service and reduce costs. Work will be started immediately on the Portland-San Francisco airway.

The Department will maintain the existing lights along the coast route for 21 years along five routes. As many as possible of the unopened fields along the way will be added. Where they are not available the government will lease lands, build roads and do the construction work. The city will be instrumental in the planning of several phases, the first one the main terminal.

Boeing Buys 300 34s

In another open market 300 Boeing 34s will be put on 300 more routes every 100 miles and 100 more will be added at each landing field. Where the country is rough, ranges, forests of timber, swamps, etc., will be considered in the location of the landing fields, or such locations as the nearest town, because the cost of the landing fields will be high.

The plan, according to S. B. Driggs, will be to add 100 more landing fields to the 300 already in existence. The 300 existing landing fields will be 300 more.

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Open Hotel Air Services

CHESTER, ILL.—The Central Airways Corp., Chicago, Ill., has made arrangements with the Hotel St. Charles, St. Charles, Ill., to provide a room for the use of passengers at the hotel. Guests at the hotel will have a place available for their use upon call. Many members of the Chester Club, Chicago, are reported to avoid the use of the hotel. The room at the Hotel St. Charles will be used for the convenience of passengers during the two-day regatta at the conclusion of the festival.

Open 135 Acre Field At East Liverpool, O.

EAST LIVERPOOL, O.—Recently opened the Lyle Highway field south of East Liverpool, for the Chamber of Commerce Field comprises 135 acres. Landscaping is being prepared with service facilities for planes. The 135 acre field is to be used for the 1939 Ohio State Fair. The 135 acre field is to be used for the 1939 Ohio State Fair. The 135 acre field is to be used for the 1939 Ohio State Fair.

FOREIGN ACTIVITIES

Civil Aeronautics Regulated in Cuba

Governing Body is Appointed in Service of Army General Staff

HABANA, CUBA.—Cuba having organized its own rules and regulations governing civil aeronautics, is permitting no civilian air operations without the permission of the government or the general staff. This step is a result of the rejection by Cuba of the Icariaia Royal Convention for Air Navigation of 1929.

The proposed committee became one of the first of nations concerning civil aeronautics. The regulations will be interpreted and explained by a body known as the International Commission and at least one member from each of the members of our army and marines will be appointed by the secretary of war and marine and will constitute the commission. These members will be chosen from the War Service, Auditor Service and General Staff of the Cuban

Commission to be Active.

The commission will obtain and publish information on external and foreign air navigation. It will control and interpret the international rules and regulations of civil aeronautics and equipment when provided for military use, making all the necessary arrangements and will regulate the investigations, classification and examination of aircraft. It will also determine depreciation to be used by individuals or groups engaged in manufacturing, materials, airports and other services, parts, tools, instruments and other requirements necessary to air transportation and storage.

Aircraft will be divided into four general groups, combat and private. The combat aircraft will have maximum plane endurance and will keep maximum load, maximum range and maximum speed. The combat aircraft will be imported and of great importance and aviation instruction. The commission will enforce the system because of all matters handled by the commission.

Meteorites to Germany

LONDON, ENGLAND.—The Council of the Institute of Metals has accepted an invitation from the Vienna Deutsches Ingenieur und Denkschafft Institut to receive and examine meteorites sent by the Institute of the Institute in Germany. The meeting will take place in December. It is expected to prove very interesting in the hands of members.

For Jap Defense



Arriving one of the large, possibly field-castable iron in the Japanese in recent days. Meteorites of India.

International Opens New Survey Division

OTTAWA, CANADA.—A new road and bridge division of the International Survey Canadian branch has been established. The new division will be responsible for all surveys in Canada where the flying in airplanes has been accomplished. At the present time survey work is being carried out with two Westinghouse aircraft, one of which is equipped with a camera to take photographs when provided for military use, making all the necessary arrangements and will regulate the investigations, classification and examination of aircraft. It will also determine depreciation to be used by individuals or groups engaged in manufacturing, materials, airports and other services, parts, tools, instruments and other requirements necessary to air transportation and storage.

The commission will be divided into four general groups, combat and private. The combat aircraft will have maximum plane endurance and will keep maximum load, maximum range and maximum speed. The combat aircraft will be imported and of great importance and aviation instruction. The commission will enforce the system because of all matters handled by the commission.

Great "Romeo" in Test Flights

ERFURT, GERMANY.—Test flights are being made here in the newly aerodromed Ercraft, the largest aircraft ever built by the Ruhmkorff-Leyland Aeroplane Works. Built for transoceanic service, according to reports, the first flight the giant metal nose was the size of a 20 ft. run. Pilot Max Hahn, who has made many flights in Type B-11 aircraft, reported that the Ercraft had a top speed of 120 miles per hour. The first 12 test flights were delivered by Luft Capital, test pilot for the Daimler-Benz Company.

Large Increase Noted in Russian Air Traffic

MOSCOW, RUSSIA.—A three-fold increase has been noted in commercial air transport volume in Soviet Russia from 1936 to 1937, according to an announcement recently made under the signature of the chief of the State Committee of Civil Aviation and 194,000 passengers and 24,000 kilograms of mail carried. During the year 2,382 trips were made and the distance covered was more than 1,100,000 km. Present to date there are 100 aircraft, of 7,000 m. load limit, in Soviet commercial planes.

Airports have also been put in order, more including those during planning stage, and 100 airports have been built, about 20,000 acres of land selected and 5,000 sq. m. of territory was photographed, for future surveys map-making and other purposes. A 3,000 sq. m. flight has been planned for the construction of the Moscow-Aviation airport and will be made by the hydroplane Soviet March. Ships will be made at various points during the flight.

Commercial airports have been established in Moscow, Smolensk, Vitebsk, Lida, Grodno, Leningrad, Kirov, Rostov-on-Don, Minsk, Novgorod, Vitebsk, Kovno and Baku.

U.S. Firm at Paris Show

PARIS, FRANCE.—A pre-assembly of components of model engines and all major trunks in construction was presented at the 1938 Salon de l'Aéronautique by the American firm. The American aircraft were recently represented at the show, these being the Parelli-Aerline Corp., which displayed the Comet engine and photographic cameras, and French Avions C. G. Falaise, whose American management were represented by photographs on display at the American Commercial Chamber of Commerce booth. British visitors to the show included Mr. George W. Smith, president of the British Aircraft Corporation, and Mr. J. H. Macmillan, chairman of the new division of Daimler-Benz.

Club Gets Third Mesh

MONTREAL, CANADA.—The Montreal Light Aeroplane Club, through a job lot, has placed an order for 30,000 pieces of wire to produce a third mesh for their biplane, the "Montreal Mesh" plane. The first two machines given to the club by the Dominion Government in assistance with the plan to promote flying clubs in the larger cities of the country. The plane, delivered by Leigh Capital, test pilot for the Daimler-Benz Company.

THE BUYER'S LOG BOOK

Kinnear Hangar Door

THE KINNAR AIR hangar door produced by the Kinnear Manufacturing Co., at Columbus, Ohio, has been in use for a number of years. The doors are made in the form of double curtains which open outward in a very simple manner. They are constructed in units approximately 20 ft. in width and of any required height with sliding door, however, it is recommended that the opening to be closed when the doors are moved aside.

Hangar doors are either hand or motor operated. Both types are mounted on the face of the wall either inside or outside the building. The curtains travel in guides attached to the sides of the supporting posts and to the ends of the header. Motor operated doors are provided with one or two power units controlled by push button switches. The doors may be stopped at any point in motion.



Hangar door Kinnear type

close set of track and held there indefinitely. A hand wheel is provided which cuts off the current at a certain point in the travel of the curtain and immediately a magnetic brake is automatically applied.

Where the Kinnear door is to be used consideration must be given to the track on which it is to be mounted so that the door will carry the load. The curtains are made of semi-flexible strip rolled from corner bending steel and heavily galvanized to the last particle. The doors are designed to withstand the full pressure of high winds. All parts are interchangeable and may be easily replaced in case of accidental damage. The entire equipment is trouble-free and generally automatic in operation.

Hy-lum Alloy

THE SHRIETT Manganese Corp. at Lakewood, Ohio, recently placed on the market a balanced aluminum alloy that is fundamentally new in composition and in application to a wide variety of products. The new alloy is known by the registered name of Hy-lum.

Research and experimental work on the alloy was done by Dr. S. A. Hyatt, formerly research director of his father, who is an officer of the Shriett Manganese Corporation and a distinguished authority on non-ferrous metals.

Prior to the introduction of Hy-lum, the alloying elements of aluminum were chiefly copper, manganese, silicon

and magnesium. Hy-lum departs largely from these elements, employing instead nickel and the metals of the cobalt group. The total addition of all heavy metals is approximately two per cent.

Among the outstanding qualities claimed for Hy-lum are color, non-tarnishing, non-corroding, resilience, welding, strength and plasticity, non-flamability, low specific gravity, wide limits of temperature in heat treatment, and stability after heat treatment even at elevated temperatures.

Hy-lum has a pure white color like that of silver and retains the grayish blue cast of aluminum. It is manufactured in four different classes designated A, B, C and D which differ in physical properties but are virtually the same in properties. Hy-lum produces complete the cold and strip sheet, sheet circles, extruded structural and special shapes, castings, bars and rods, wire and mesh, stampings, saw machine products and forgings. All of these can be furnished heat treated.

Oxweld Portable Unit

A COMPLETE portable welding and cutting unit is now being produced by the Gould Aeroplane Co., telephone New York Office is at 30 E. 42d St. This unit is a highly useful addition to Aeroplane equipment and is invaluable for emergency repair work and for general purpose work which does not require that both the welding and cutting blowpipes be used simultaneously. It is manufactured by the Oxweld Co., a unit of the Curtis-Cardsell and Curtis Corp. and has offices in all principal cities of the United States.

The unit is mounted on a two-wheel hand truck and is sufficiently large to accommodate the wages and cutting blowpipes. The cutting blowpipes are made of an oxygen acetylene pipe which is supplied by a gas cylinder and the same character of work can be done with the unit.

The equipment supplied includes one Type C-14 (or C-6) cutting blowpipe with nozzle, lighter and wrenches and Type W-1 welding blowpipe with fuel tank holding propane, weight and wrench. Type C-14 cutting blowpipe weighs 4000 lb. in gauge and 300 lb. in gauge and No. 36 wrench. Type C-14 cutting blowpipe regulator with 280 lb. and 10 lb. in gauge, one 25 ft. length of 16 in. oxygen hose and one 25 ft. length of 16 in. rad acetylene hose with the necessary clamps and one pair of gages are also furnished. Extra lengths of gas in multiples of 25 ft. can be added as desired. An instruction booklet and service chart are also supplied.

Overall dimensions of the equipment of the Underwriters'



Portable unit Oxweld type

Laborers, Inc., under the direction of the National Board of Fire Underwriters. A nation wide organization of insurance companies, express companies, and at the disposal of users, a complete list of Charcoal apparatus. A complete catalogue of Charcoal equipment will be sent on request to any of the branches of the company.

Bendix Brakes

ONE OF the important steps in the development of aircraft has been the incorporation of brakes to reduce landing and overrun in the case of control of planes on the ground. The Bendix Brake Co., of South Bend, Ind., is now in production on complete units consisting of wheel and brake for airplane use. The company is prepared to supply any of the most used auto-



Bendix Auto-wheel-cover sprung shock absorber assembly.

of wheel on short notice and will supply brake assemblies and tire combinations of other types of wheel.

The Bendix-Lockheed model is recommended for high and uniform weight and is built in two sizes, standard and light. The size is given as the U. S. Air Corps specification which are also used as a basis for axle diameter and length. The test consists of a tire wheel with a braking cover upon which the brake staff is mounted. The brake is of the well known two shoe Servotrac, which has been used for several years on some of the best known makes of automobile. It is extremely powerful and in the same time perfectly controllable, a minimum pedal pressure being required to obtain full braking effect.

Adjustment of brakes is simple and can be made entirely from the outside of the axle. Angle precision has been made to take the thrust in the wheel by the use of specially constructed thrust bearings. The wheel unit is watertight and the valve connection and enables the operator to utilize the standard 45 deg airplane valve so that no special parts need be carried along. All parts of the unit are made of high grade sheeting after except the springs, anchor pins and castings.

Shakespeare Controls

A WIDE selection of controls for chain, radiotelegraph, heater, boiler and other purposes is offered by the Shakespeare Products Co., of Kalamazoo, Mich. Shakespeare controls are of the type employing a stiff wire pivoting at a flexible tube and tensioned by a plunger rod. A similar control actuated by a lever is also made by the

company. The Shakespeare line has been designed with interchangeable parts so that more than 50 combinations of different plunger and fast wire guides are available for quick delivery. Special designed controls to fulfill the requirements of manufacturers are also produced by the company.

Shuttlecock controls are well constructed, having brass push rods, bushings and body tubes for the push pull types.



Special converter hand used to adapt tube and wire to solid and control.

Flexible tubing and control wires are made in special form to prevent crystallization and breakage. All face plates are cut from brass. Push pull types are installed without the use of screws as bolts and are made up in standard threads of 1/8 in., 1/4 in. or 2 1/4 in. The diameter of the standard face plate is 3 1/2 in. All tubes are threaded 1/4-28 S.A.E. Special care has been taken to prevent snagging of wire and ends of flexible tube and construction has been approved by the Department of Commerce.

The Aero Corporation of California

(Continued from page 533)

regional Pekin Airlines, several folder planes, equipped with Pratt and Whitney "Hornet" engines, will be placed in operation November 1, when an extension of the line through Douglas, Ariz., El Paso, Sweetwater, Abilene, Tex., Worth to Dallas, Tex., will be opened.

A daily service on this extension is planned. Passes will leave Los Angeles at 8 A. M. and Dallas at 8:10 A. M., making the run between those cities in 3 1/2 hr. The approximate traveling time by rail is 60 hr.

The aviation line has been incorporated as Standard Air Lines. Mr. Fiske is the president, Mr. Robbie and Walker



Personnel of Aero Corporation of California.

Harrison are vice-presidents, and E. B. Chisholm is the secretary of the new corporation. Nelsie Nelsy is the attorney.

It is planned that a spring to further extend the line with the institution of a branch from Tucson, Ariz., to Marfa, Tex. The proposed route will run through Nogales, Ariz., Benson, Tucson, Marfa, via the Gulf of California, El Paso, New Mexico, which is located on the Rio Grande, San Eliz and Colorado, Tex.

Whichever the precise route is to government flight for flying the company plans to inaugurate a night service which would probably be extremely popular with

certain classes of persons such as actors and salesmen.

Present equipment at the Los Angeles terminal consists of a perfectly equipped terminal building with every便利 of town and on a large level plot. Two ways are provided, the east-west runway being 500 by 1600 ft. and the northeast-southwest runway 300 ft. wide and 3000 ft. long. A slope seaward of one foot in 30 ft. of great assistance to planes taking off on the northward runway. A very great deal of hangar space is available at the field, one hangar alone being able to house eight Eaglebrook planes, and a special Pekin hanger is provided with tool shed trucks and tools for rapid assembling. Waiting room, ticket counter, company telephone, engine and machine shop with Wright Whirlwind running mind in only part of the field equipment.

Three Intermediate Stages

Stops will be made en route at Rhyne, Desert Center and Palms Springs to pick up passengers. Each of these points houses a radio station and there stops are made at Palm Springs, a radio station and post office center where a Pekin en route field is provided at a distance of six miles from our business district. The field at Tucson is a 300 acre AAA airport only two rods from the business district. Terminal space is leased at both of these fields through Kirk Moore, secretary of the Tucson Chamber of Commerce, and Attorney H. B. Watson. Taxi service to Los Angeles is provided by Aeris Corp. cars at Phoenix by the El Dorado Divisional System and at Tucson by Yellow Cab. This service is included in the regular fare.

Point and Club Cooperation

Passenger patronage over this line has been greatly boosted by the cooperation of Arizona newspapers and Chambers of Commerce, and by the Los Angeles Givers Club. An interesting observation is that the great majority of passengers have been Arizona people flying to Los Angeles and back.

Tickets from Los Angeles are sold by all agencies, from Phoenix by the El Dorado Divisional System and from Tucson by the Yellow Cab Company. The passenger

\$1.60 per lb. or fraction thereof between L.A. and Tucson, plus delivery to door or base or terminal as required at all terminals and if after this route the party is not located the package will be returned to owner without additional expense. A constantly increasing volume of excess mail is an indication of the business to be expected from this service when business men become aware of the convenience. This freight service will be helped by signing contracts with certain firms for



The Field Raymond, Pasadena, Calif., as seen from the air by passengers flying the Los Angeles-Tucson route.

a graduated passenger monthly postage. Fares now in effect are: Western Air Supply, Los Angeles and San Beda Co. of Arizona, Standard Liner Co., Phoenix, and the Union Oil Co. of Calif. The Red Arrow Messenger Service, Los Angeles, has used as local freight agent.

The Aero Corporation of California was organized in February 1936 with the following officers:

Laur. W. Jack Fiske, pres.; R. A. Edwards, vice pres.; Paul B. Robbie, Jr., exec. secy.; Charles W. Cradick, eng.; and Walter A. Hamilton, 2nd vice pres.

Operating equipment of that time consisted of three twin motor Douglas's. At the present time there are seven Altimax Engelmans and two Pekin Universals in daily use with a force of 28 persons on the payroll. Aero Corp. planes fly an average of 1800 mi. per day and have so far carried over 30,000 passengers without injury. This development has been accomplished by the original organizers of the Company without assistance of outside funds, and is the result of applying business methods to the operation of aircraft. The Aero Corp. is the 20th largest distributorship holder for Alexander Kerosene in June 1935, the Northern part recently and the Southern California and Arizona agency for Pekin planes in April 1937.

The "Sign Carrier I"

(Continued from page 532)

If sign carrying, may be used as a transport. A company has been formed for baggage and air mail, and the plane has been equipped with seats for the accommodation of 10 passengers. The plane is powered with three engines. A Pekin, a Pratt and Whitney Whirlwind, and a Wright Whirlwind. Engines are mounted in nacelles between the wings. These engines are strapped with band inertia starters. In designing the nacelles for the outboard engines, sufficient

space is left for the installation of a propeller. The plane is powered with three engines. A Pekin, a Pratt and Whitney Whirlwind, and a Wright Whirlwind. Engines are mounted in nacelles between the wings. These engines are strapped with band inertia starters. In designing the nacelles for the outboard engines, sufficient

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The AIRSEDAN



139 m. p. h.

By official test, the fastest ship in the Reliability Tour

Specifications

Wing Span	40 ft
Wing Area	240 sq. ft.
Length	23 ft
Useful Load	1,440 lbs
Seating Capacity	Pilot and 2 Passengers

Performance

High Speed (Sea Level)	139.5 M.P.H.
Landing Speed	45 M.P.H.
Cruising Speed	115 M.P.H.

Power Plant

Engine	Whitworth
Horsepower	200 at 1,800 R.P.M.
Fuel Capacity	30 gallons
Oil Capacity	5 gallons

Equipment

Steering, Brakes, Head Propeller, Compressor, Air Speed Indicator, Navigation Lights, Tachometer, Altimeter, Clock, Fuel Economy, Fuel, Oil Pressure, and Oil Temperature Gauges, Air Corps Thermals, Stunners and Fuel Valves, Exhaust Manifold, Cabin Heater.

Manufactured Under Official Type Certificate No. 46

Price \$12,000

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Buhl Aircraft Company
MARYSVILLE, MICHIGAN

THANK YOU for visiting AVIATION

AVIATION
August 10, 1928

space was allowed so that two Pratt and Whitney Wasp engines could have been installed without overhang at desired.

With the two Whirlwinds and the Wasp engine, the plane embodies the same features of maneuverability and short-run landings and take-offs as does the Porthole. With a full load it has a high speed of 133 m. p. h. and a landing speed of 46 m. p. h. Its initial rate of climb is 250 ft. a min. Its range is 500 miles. Trimming up 1,800 rpm the thrust required is 75 hp. The fuel system has a total capacity of 100 gal. of gasoline. Fuel tanks are available for gasoline in a tank each bar is planned for both the main and auxiliary gasoline tanks which hold 125 gal. and 145 gal. respectively. These valves are located where they can be opened and closed by the pilot. They allow the fuel to run out at the trailing edge of the wings when open. The oil system has a capacity of 30 gal.

Officially Proven Performance

Among other features of the plane is a landing gear in the standard Army Air Service split axle type. The wheels have brakes and are also equipped with mudguards. The instruments selected were all manufactured by Pioneer Instrument Co., Brooklyn, N. Y. There are three gyroscopes, one of which is in the cockpit and the other in the cabin. There are four fuel and oil quantity indicators, three altimeters, three of pressure gauges, three oil temperature gauges, one tachometer and one clock.

G. Robert Peacock who was formerly connected with Wright Aeronautical Corp. is president of Aerial Advertising, Inc. Robert Nichols, former holder of the world's altitude record is vice-president of the Company. Charles E. Lorraine, president of the Wright Aeromot



A group of officials of Aerial Advertising, Inc., and Keystone Corp. conferring at their plant in front of the new Keystone "Sign Carrier."

Keystone Corp., and Col. Benjamin F. Clegg, president of the X. A. A. are visiting the directors of the organization.

The specifications of the Sign Carrier are as follows:

Weight Loaded (as a Transport)	31,370 lbs
Weight Loaded (as a Sign Carrier)	78,000 lbs
Weight Empty (as a Transport)	16,000 lbs
Weight Empty (as a Sign Carrier)	22,000 lbs
Upper Wing Area	986 sq. ft.

AVIATION
August 10, 1928

Lower Wing (as a Transport)	354 sq. ft.
Lower Wing (as a Sign Carrier)	124 sq. ft.
Total Wing Area (as a Transport)	1,140 sq. ft.
Total Wing Area (as a Sign Carrier)	1,250 sq. ft.
Overall Length	44 ft. 6 in.
Upper Wing Span	73 ft.
Lower Wing Span	60 ft. 6 in.
Chord, Upper Wing	8 ft.
Chord, Lower Wing	8 ft.
Angle of incidence, Upper	5 Deg.
Stagger	2 Deg.
Top	130 lbs. to 37 lbs. per sq. ft.
Bottom, Upper Wing	2 Deg.
Bottom, Lower Wing	2 Deg.
Tread of Hand Carriage	15 ft. 4 in.
Wing Loading (as Transport)	10 lbs. per sq. ft.
Wing Loading (as Sign Carrier)	10 lbs. per sq. ft.
Power Loading (as Transport)	18 lbs. per sq. ft.
Power Loading (as Sign Carrier)	11.6 lbs. per sq. ft.
Performance with Full Load	
Full Speed (sea level)	113.5 M.P.H.
Level Flight Speed (at 10,000 ft.)	105.5 M.P.H.
Initial Rate of Climb	290 ft. per min.
Range	400 mi.
Power Plant	265 hp. or 1800 rpm
(2) Wright "Whirlwind," 1 Pratt and Whitney "Wasp."	

Crawford Metal Plane

(Continued from page 583)

four below with a cable spur in the trailing edge. No cables are used except a single stay in the rear end of each wing. The two main spars are joined together at the rear and fastened together at the center and a bridging at the joint holds them fast from the center in which the lower arm from the body extends. A short bridging is used at the rear end of the wing in order that a look up along the top chordwise form may be taken on this, showing the internal and increasing the efficiency of the wing. The ribs are mounted even two feet along the top of the wing from the leading edge to the second spar in order to keep the wing curve from flattening out too top.

14-Gauge Channel Section Board Used

Channel section dimensions of 14 gauge has been used for all spars, the dimensions being 1½ in. deep and one inch wide across the face. Width drag and compression stresses are carried through the wing; the spars are mounted in place by diagonal circular chocks extending alternately from top to bottom spar. Since the wing taper causes the spars to converge appreciably these short bridge members are of varying length throughout the wing. The bottom spar is made of 14 gauge channel section, having a slight camber sectionwise, and crossing the top and bottom wing covering lattice sheet.

Airfoils are of 26 gauge sheeting carried to about trailing and mounted to the rear spar in three or four places along the lower side. Cogged is by push and pull holes and flat cleats is used to hold the airfoils onto the rear spar in the joint.

Fuel supply is all gravity feed and is carried in a 22 gal. gasoline tank mounted in the fuselage in front of the passenger cockpit and by two 15 gallon tanks, one mounted in the lower portion of each wing section. An 8 gal. oil tank is mounted in the fore part of the fuselage directly behind the firewall.

The wing is carried to the body by eight semi-ellipti-



THE KEYSTONE "PUP"

Training Plane Development

THE DEVELOPMENT of suitable training equipment for the Navy has required years of concentrated effort on the part of Navy Specialists, coordinating with aeronautical engineers in the industry.

A striking reward for their combined efforts is afforded in the recently accepted Keystone "Pup," which has justly merited the enthusiastic comments heard from all sides.

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KESTONE AIRCRAFT CORP. K MUSKEL, PENNSYLVANIA

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Enclosed please find check for \$2.50, for which send me copy of *Aerial Navigation and Meteorology*.

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The Cranford plane as it looks from the front

isology to the forward and rear lower spars supported by a joint spar from the center of the wings. All struts are of steel and all rivets are driven points while fittings are attached by heat shrink. Other rivets throughout the plane are darts.

The excellent performance of this plane is said to be largely due to the special incandescent wing, which changes from two degrees at the center to zero degrees at the tips. The flights throughout the entire airplane both externally and internally is two tons of grey engine enamel. The original oil tank was of the leaf spring type but this was changed to a large oval rule with gutter sides and shock absorber. All controls are push and pull rather than the rudder which is operated by means of 2.50 x .060 steel wire.

The construction of the plane was carried on in a small back yard and within a 16 ft. garage. Originally started by Harry Larcher who now owns the airplane, the final engineering and construction was done by Harvey Cranford. Much of the sheeting was placed on home made wooden form; a great deal of the bending and almost all



Side view of the all-metal Cranford plane

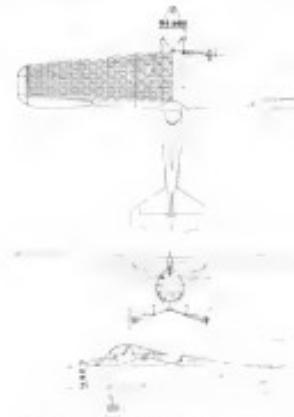
of the welding was done in the mud garage, and the riveting was carried on by means of an air riveter supplied with pressure from a Ford operated air compressor. Many changes and delays were necessary during the first construction, which naturally was apprehensive on certain parts due to the fact that neither Mr. Larcher nor Mr. Cranford could devote much of their time to the work.

The cost of the plane, which is now sold to have proved itself to be of practical design, is said not to exceed

\$2700 and it is thought that this model could be produced for \$800 less than the figure if built in quantities.

Mr. Cranford and his associate are as well satisfied with the performance of this plane that designs have been drawn up for three more of varying types but all based on the design of the Cranford Metal Plane No. 1. Production has already commenced on these three planes and it is said that the larger of the three, a six place cabin job is already sold. A company is being formed to manufacture this type of aircraft under construction and Mr. Cranford has announced that a factory building will be taken over at once in order to mass production of the new planes.

Several features of the plane now under way are of particular interest. The large plane will employ cellular carburetor spats in the centerline wing and will be equipped with external struts as an additional safety factor. It will have a copy of the wing used on the German Bremen with the top curved wing tips. The twin plane



Technical drawing of the Cranford plane's tail section

is designed close to the ground for slow landing, will be equipped with brakes and will carry two jobs in a four-wheel cockpit similar to that on the Fokker. This plane will be equipped with low and high water and fuel feed tanks.

Of the small planes, one is to be a two place training plane to be available in either high or low wing design and to sell for approximately \$800 without engine. The other plane is of similar type but will be of four place design with a new passenger arrangement that seems the term Cabinjob by which it is to be designated. Two passengers will normally ride side by side in the enclosed cabin under the wing but should accommodations be desired for two or more persons there is a removable cockpit



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ADAPTABLE the Heywood Starter is manufactured for and particularly adaptable to all engines used in modern aircraft.

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provided in the rear which may be reached by lifting a segment of the upper fuselage covering and unfolding the seat cushions which will be attached to it in a manner similar to that now used in the familiar automobile manufacture. The passengers in the rear will be seen enclosed, being seated well down in the body of the plane. This



Front view of the Grumman Travel Plane

will be able to converse with persons in the forward cabin through an aperture between the rear cockpit and the rear cabin. It is equipped with sliding glass windows for vision and ventilation.

Due to the efficient wing used and to the great strength of the structure employed it is said that these new planes will be a marked advance over the accepted commercial types now in use.

Specifications and performance figures on the Grumman Travel Plane No. 1 are given below as they were supplied by the designer and manufacturer:

Length overall	24 ft. 9 in.
Height overall	8 ft. 4 in.
Airfoil	German Junkers
Span	34 ft.
Closed	6 ft. 6 in. (max.) 2 ft. 3 in. (min.)
Area of wing, total	21 sq. ft.
Wing loading	137 lb. per sq. ft.
Wt. load	1000 lb.
Dead weight load	1800 lb.
Louis weight loaded	2800 lb.
Power plant	165 hp. engine motor
Wing loading	137 lb. per sq. ft.
Power loading	107.6 lb. per hp.
High speed	148 m.p.h.
Cruising speed	130 m.p.h.
Landing speed	39 m.p.h.
Take-off	300 ft.
Landing (at without brakes)	300 ft.
Climb at sea level	3000 ft. per min.
Service ceiling	20,000 ft.
Gasoline capacity	32 gal.

Care and Maintenance of Siemens Engines

(Continued from page 330)

able lock was. Each cylinder is bolted to the crankcase with four large head bolts.

The cylinder operates the cam down through an intermediate spur gear train. The rocker arms are carried in bronze bushings inserted in the aluminum alloy crank case and the hollow tappets contain a long spring which prevents the valve push rod from falling out in the event

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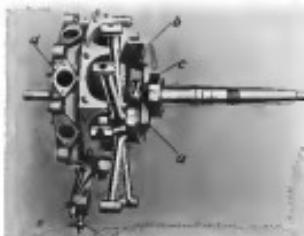
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A view of the crank drive of the Streamline mica cylinder engine. (a) Crankshaft; (b) Counter weight; (c) Master rod; (d) Conversion for aircraft pipes; (e) Oil pump; (f) The cylinder.

at 90 or 300 m. 200 deg. Fahrenheit and a carbon residue of not more than 15 percent. Proper oil must be used. Otherwise the engine will run at a higher temperature than usual. Loss of the lubrication is sufficient to prevent sticking, very serious trouble will occur in case such as scorched cylinders, or even cracked cylinder heads. Naturally, this will reduce the total life of the engine.

The carburetors used on these engines are simple in design but very efficient. For early warning it is advisable to prime the engine by filling the priming cup with a small amount of fuel or by connecting a hand primer in series with the priming cup. This will insure a good start even from the cold. It will make several suggestions for adjusting the carburetor. If they are followed there will be no trouble in securing the maximum performance. The suggestions are as follows:

1. Check the float valve screws to see if they are

going to take the plane up. This is very important. No engine can start in regard to lack of lubrication if this suggestion is ignored.

A clear trouble can observe that if the engine has not been run for several days, and then is turned up suddenly without warming the engine or adding liquid oil to prove that the engine will run for some length of time before solvent oil will be circulated by the pump proper. It should be borne in mind that the pump operates at one-tenth of the crankshaft speed which is quite ample for perfect lubrication under normal operating conditions.

There is no streamer in the rear end of the engine which may be removed for cleaning without taking off the engine. There is a streamer which is a left-hand streamer. The streamer will not permit any foreign matter to pass into the crankcase, thus insuring a clean oil supply. There are two other oil strainers in the lubricating system. One located in the sump in the bottom of the crankcase, and the other is between the oil tank and pressure pump. These strainers should be cleaned about every 15 hr. If this is not done cavitation will be created and proper lubrication hindered.

The cooling system is of an extremely low pressure type and sends a very limited amount of oil to the engine. Requires not only a very high quality of mineral oil but oil having the exact specifications and characteristics as that recommended by the makers of the engine. The oil should have a flash point of between 460 deg. and 470 deg. at cold start with a 50 deg. insulation viscosity.

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Specifications of the Material

(Continued from page 529)

The body of the specification is occupied, first, with a full list of the materials required, specifying their mere numbers, sizes, characters, and quantities. Then for each item of material or for the part as a whole, a detailed specification of labor, giving the drawing number, name of supplier, lot or code number, cost, time of delivery, what is to be done or reference to a standard instruction sheet, the rate of production to be expected for each item in the production group, number of pieces, and total time expected. The footing of the total hours scheduled for all men on all operations gives the total work-hours, while totaling the job-times (one man-hours) scheduled for each operation gives the total scheduled thus far the whole sub-assembly, an end in the heading:

Office Copy to Shop Copy

In the marginal columns at the right are extended the standard costs of material, labor, and the bonuses applying on them. These columns appear only on the office copies, and not on those that are issued in the shop. In the example shown, all the materials called for are new materials, but such specifications are usually taken in larger groups and these again in still larger areas, until the final complete airplane engine is reached, so a general specification will call for parts already worked, as well as for new materials.

So much for the form and data of the specification; consider, next, their use, first in specifying material, and then in specifying labor.

Drawing Shows a Del of Materials

When information as to materials required can only be had by taking it from the working drawings, considerable time may be spent in trying to get it. This could be a real handicap if it had to be repeated to get the part. If a part is ordered, so much easier it is to compare for the drawing to show a full of materials. When when a part is to be made but once or twice, a list of materials is desirable to ensure against omissions and errors. Certainly no one is more competent to list all the parts, bolts, screws, etc., than the design engineer who designed the part. Here, however, we run into another difficulty. Drawings are dangerous, as stock lists are, because they are liable to be copied and misused. Unchecked parts have been well standardized and listed, and unless lists of permissible standards are available to the designer and their use is enforced, he will call for any parts that suit his convenience. Moreover, different drawers will call the same thing by different names. These are causes of unnecessary ordering and multiplication of kinds of stock—both very undesirable.

Should Standardize Stocks

Stocks should be standardized, and limited strictly to those kinds and sizes which have been selected. The best way to enforce these standards is to have all materials covered by someone of matched experience, able to read drawings, familiar with the standards and the stocks in hand, not a draftsman but a "full-of-materials check." In a small establishment, he may combine other duties with these. Such a person will ordinarily have his wages several times over, through holding to standards and reducing to the use of materials that are available. He may,

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also, save the time of the draftsmen, usually a highly-paid men, by relieving one of the labor of preparing the bills of material. When this is done, it is better to make these bills separate from the drawings. There are many advantages to be gained in this way. There will be separation from the acts made of the specifications, which embody and extend the bills of material.

A Word of Forecast

But even when a bill of material has been correctly prepared, the materials have to be requisitioned from the stockroom, priced, credited on the stock-cards or ledger and charged to cost of the work. The writing of such requisitions is frequently left to the foreman or supervisor. Even when he is able to copy them from existing bills of material, this is a wasteful plan, for it is requiring clerical duties of men who are often either poor clerks, or bhortened by pencil work, do it haphazard and make mistakes. Moreover, their time is much more valuable in supervision or direct production. It does not pay to do pencil work in this shop. It may be hard to believe that a man can do his job better when he has been selected in advance, on all that is, except repair, experimental, or development work, the supervisor should however be prepared in advance by, or under the supervision, of the bill-of-materials clerk. These requisitions should then be issued to the shop with the order for the job, enabling the supervisor any pencil work as minor requisitions by foremen and workers.

Another advantage results. It now becomes easy to prepare a duplicate bill and give one copy, in advance, to the stockroom. This copy can be used as a master bill in case reorders, either a day or two before they are required, and have them ready for the foreman's use. This saves a lot of working at the store-room windows, with men and machines standing idle. The supervisor is also enabled to get or supplies if he is running short, and so save hold-ups on the job. If special materials have to be purchased, the bill-of-materials clerk is also in position to start the "ball rolling" promptly.

Copied from Bills of Material

One method of preparing these job-winning requisitions is to have them copied by a typist from the bills of material. We have found this method to be long performed and of the "hit-or-miss" type, and not entirely satisfactory. In some cases, this is found desirable, but if the bills of material are prepared in proper form so that they can easily be multiplied in quantity by line-printing or hectograph, they themselves may be used as the store-room requisitions, as affecting a considerable saving in clerical labor. When this plan is followed, the foreman and the stockroom each receive a copy, bearing the number of the original bill of material. The stockroom gets the material ready and the foreman, in turn, either uses one copy, or for parts as far as he needs, first time to time. As these are delivered, the stockroom checks them off on his copy. He may get the foreman's signature if desired. When all have been delivered, the stockroom sends his copy to the office to be priced, credited, in stores and charged to work in process. No other material than that called for in the bill of material may regularly be drawn out for standard production. If none of it is needed, and must be replaced, a special requisition is required, approved by some one in authority, who will inquire into the correctness of the place the responsibility. This plan does away with all requisition writing by foremen and workers on standard work, and is the plan illustrated and recommended here.

* * *

Specifications of Labor will be taken up by the author in another article, which will appear in an early issue.

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Australian Aerial Services.

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Works & Railways Department.

(Manufacture of aerofoil bulk metal storage plant)

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SIDE SLIPS

By ROBERT R. OSBORN

The papers state that a recent bride arriving on a airplane to New York from a wedding in the Midwest, "had a friend who was not to cover the site in an airplane." We must point out again that it is a dangerous practice to sit on an airplane in a wedding celebration, as there is always the possibility of the plane getting excited too, and throwing a couple of shoes.

* * *

About a week ago the air liner "Flying Scotsman" was a race from London to Edinburgh by only a quarter of an hour from the train "Flying Scotsman," the plane making two stops and the train none—confirming the well-established belief that the Scotch men are class.

* * *

The State Agriculture Department of Nevada and Oregon have decided that the airplane has proved itself to be of great value to the farmers of those states, sending out announcements to that effect in the newspapers. We can add similar testimony on behalf of the farmers in New York State, particularly those on Long Island. Most of them were never able to show a profit at all until the recent boom in potato prices, and all of the new farms begun to have forced landings in their potato patches and corn fields, at about one hundred dollars per landing.

* * *

A new sight-seeing service has opened up in New York city under Federal Flying boats. The passengers are taken for a tour of the harbor including a circle around the Statue of Liberty, after showing them parts of the usual theater ticket agencies. So don't be surprised if you next visit to New York a ticket operator calls up to you and offers two on the aisle, only two rows back of the pilot.

* * *

As the Bolshevik Political Party, sponsored by Dafe, has fit its candidate for president, Mr. Will Rogers, the famous Ambassador William's a Puffin, and Arkansas and Texas Senator, will like to put in a good word for him. He has been preaching and practicing travel by air for years and is some share of the present success of the party due to his efforts. He has no acquaintance of his political pals as yet. We're going to choose Party Leaders, Stegma, Self-Wreck, Luncheon Club, Vice President, Small Flap, Conversations, Golf Party, and Lots of Other Things. If Mr. Rogers will include among the Other Things for elimination the publicity seekers who are presently rooting and squirming on some of aviation's dead birds, and the editors with the complex for horrible but imaginary details of the crash, we can promise him at least 20 votes. We'd like to promise more, but as it is we may have to repeat a couple of times ourselves, as we have found only seven people so far who will admit they read the column.

* * *

Mr. George A. Wiss, Jr., tells us that he had a few bad moments the other day when he was talking to an older man, another customer, who is a close friend, come in the office and start pestering the passenger. "You've a crook," he said, "and I was trying to get back." "Why, what's the matter?" asked George. "It's that passenger you sold me yesterday. I just jumped with it from 10,000 ft. and it didn't open at all."

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SPARTAN secures the world-famous WALTER ENGINE

Holder of 5 World's Records

SPARTAN Aircraft Company announces that after a thorough investigation of aircraft engines of both American and European manufacture—an investigation which carried our engineers on a European tour of fifteen thousand miles and into a majority of the important engine factories of the world—the famous WALTER Engine, manufactured at Prague, Czechoslovakia, has been selected as the ideal power plant for SPARTAN Airplanes. The WALTER Engine holds five world's records in flight, and greeting tests by our engineers have conclusively proven it to be one of the most logically developed and efficient aircraft engines made.

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Oklahoma

A scratch means - "Throw it away!"

WRIGHT Workmen do not know how to "fix" a scratch...These men, whose high technical and mechanical skill is supplemented by their feeling of personal responsibility, do not know how to remedy a defect in any finished part for a Wright engine... Their only comment when a flaw is met is "throw it away" ...A scratch however slight, a defect visible perhaps only through a microscope, is the "unlocked door" toward which stresses in the metal might strain for release.

That is why visitors to the Wright plant see discarded finished parts—to the average eye perfect in every detail—but to the searching eye of a Wright inspector unfit for service.

Nothing is left to chance in building Wright engines. Every operation is done by an expert in that individual field; every operation is inspected by another expert, before the completed, perfected and approved parts are accepted for

assembly...There is no secret behind the performance of Wright engines. Every part in the Wright engine bears the Wright name. Every part in the Wright engine is as important as every other part. Every part in the Wright engine is the individual product of specialized workmen who know that the slightest departure from the highest standard may wreck the whole.

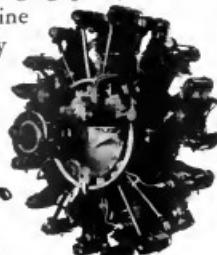
Every part in the Wright engine is sound, solid, tested and retested, made from the start to be tougher than the service it must give, and built from rough stock to assembly with full knowledge of its important function in the completed engine. Exactly what Wright engines will do is known.

For more than a decade Wright has been building engines with just such care as this...to produce aircraft power plants that measure up to the highest standard of excellence...an unchanging policy which explains Wright engine performance. That is why "more pilots fly them".

*This is why
More Pilots fly them!*



Wright "Cyclone"
Aeronautical
Engine



Wright "Whirlwind"
Aeronautical
Engine

WRIGHT

WRIGHT AERONAUTICAL CORPORATION

Patterson, N. J., U. S. A.
CANADIAN WRIGHT LIMITED, Sole Licensees for Canada, Exeter

AUTHORIZED PARTS DEALERS

Air Associates Inc.—Curtiss Field, Long Island, N. Y.

Pacific Aeromotive Corp.—Los Angeles, Cal.

Stout Air Services, Inc.—Detroit, Mich.